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Performance of promising varieties of *gobhi sarson* (*Brassica napus*) at different nitrogen levels

K.S. THAKUR, ANIL KUMAR AND SANDEEP MANUJA

Oilseeds Research Station, Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Kangra 176 001

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ABSTRACT

A field experiment was carried out at Kangra during the winter (*rabi*) seasons of 1996–97 to 1998–99 to find out the suitable high-yielding variety of *gobhi sarson* (*Brassica napus* subsp. *oleifera* var *annua*) variety and its nitrogen requirement under mid-hill conditions of north-western Himalayas. The treatments consisted of 4 *gobhi sarson* varieties ('Hyola 401', 'Neelam', 'Sheetal' and 'GSL 1') tested against 'Kranti' (check) of Indian mustard [*Brassica juncea* (L.) Czernj. & Cosson] at 3 nitrogen levels (60, 90 and 120 kg N/ha). Among different yield attributes, plant and seeds/siliqua were highest in *gobhi sarson* hybrid 'Hyola 401', while 1,000-seed weight was highest in Indian mustard 'Kranti'. In spite of poor yield due to inferior quality seed during the third year, 'Hyola 401' gave significantly highest seed yield on pooled basis. The seed yield also increased with increasing nitrogen levels, being significantly highest with the application of 120 kg N/ha. The nutrient uptake followed the same trend as that of seed yield with highest uptake values recorded from 'Hyola 401' and with the application of 120 kg N/ha.

Key words : *Gobhi sarson*, Varieties, Nitrogen

In Himachal Pradesh amongst different oilseeds crops, rapeseed-mustard group of crops rank first in acreage, though its productivity is quite low (600 kg/ha) (DES, 2000). Amongst different crops of this group, *gobhi sarson* is an introduction and is gaining popularity among farmers of the state because of its high yield potential, wider adaptability and suitability for its early sowing to make use of monsoon residual moisture. In Himachal Pradesh, about 81% of the total area is rainfed and sowing of the crop depends mainly on the residual moisture of the rainy (*kharif*) season. Presently, a number of *gobhi sarson* varieties including hybrids are available which vary in their growth and yield potential. Therefore, selection of a variety suited for a particular agro-climatic condition is of prime importance. *Gobhi sarson* is an exhaustive crop and has a high nitrogen requirement (Thakuar and Chand, 1998). Keeping these points in view, the present investigation was taken to find out the suitable high-yielding *gobhi sarson* variety and its nitrogen requirement under mid-hill condition of Himachal Pradesh.

MATERIALS AND METHODS

A field experiment was conducted during the *rabi* seasons of 1996–97 to 1998–99 at the experimental farm of Oilseeds Research Station, Kangra, Himachal Pradesh. The soil was silty clay loam, acidic (pH 6.2) with available nitrogen, phosphorus and potassium contents 450 kg/ha, 40.8 kg/ha and 124.6 kg/ha respectively. The treatments consisted of 4 *gobhi sarson* cultivars ('Hyola 401', 'Neelam', 'Sheetal' and 'GSL1') tested against 'Kranti' (check) of Indian mustard at 3 levels of nitrogen (60, 90 and 120 kg/ha). The experiment was laid out in randomized complete-block design with 3 replications. The crop was sown in the first week of October during all the seasons at row-to-row spacing of 30 cm and plant-to-plant spacing of 10 cm. The crop was fertilized uniformly with 60 kg P_2O_5 and 40 kg K_2O which were supplied at the time of sowing. The nitrogen as per the treatments was applied in 2 splits, half at the time of sowing and remaining at preflowering stage. The crop was irrigated as and when required and kept weed free by hand-weeding twice at 30 and 60 days after sowing. Data on plant height, yield attributes and yield were recorded at the time of harvesting. Oil content was determined using NMR technique. The nutrient content (nitrogen, phosphorus and potassium) was estimated separately for seed and straw and the uptake by seed and straw added to find out the total nutrient uptake. The data were analysed using analysis of variance technique.

RESULTS AND DISCUSSION

Growth and yield attributes

The varieties differed significantly for growth and yield attributes (Table 1). Amongst different genotypes, mustard

Table 1. Effect of varieties and nitrogen on yield attributes, seed yield, oil content, oil yield and protein content of *gobhi sarson*

Treatment	Plant height (cm)	Branches/plant		Siliquae/ plant	Seeds/ siliqua	1,000-seed weight (g)	Seed yield (kg/ha)	Oil content (%)	Oil yield (kg/ha)	Protein content (%)
		Primary	Secondary							
Variety										
'Hyola 401'	142	4.7	2.7	201	22.9	3.77	1,700	40.2	683.4	19.6
'Neelam'	176	5.3	1.5	179	21.1	3.50	1,247	40.9	510.0	20.2
'Sheetal'	158	6.6	1.0	189	21.8	3.82	1,569	41.3	648.0	20.6
'GSL 1'	170	5.9	2.3	196	22.5	3.19	1,546	40.9	632.3	20.2
'Kranti'	184	4.2	5.8	170	13.0	3.87	931	40.8	379.9	20.4
CD (P=0.05)	8.2	1.08	1.24	15.8	2.30	0.22	150	NS	48.1	NS
N (kg/ha)										
60	161	4.8	2.0	166	19.3	3.60	1,187	40.8	484.3	19.2
90	166	5.5	2.7	190	20.4	3.62	1,416	41.0	580.6	20.3
120	171	5.7	3.3	205	21.1	3.67	1,592	40.7	647.9	21.1
CD (P=0.05)	6.4	0.84	0.96	12.2	1.78	NS	116	NS	37.3	1.4

Table 2. Effect of varieties and nitrogen levels on total nutrient uptake in *gobhi sarson* (pooled over 3 years)

Treatment	Total nutrient uptake (kg/ha)		
	Nitrogen	Phosphorus	Potassium
Variety			
'Hyola 401'	92	29	48
'Neelam'	64	20	30
'Sheetal'	78	25	34
'GSL 1'	75	26	32
'Kranti'	58	14	24
CD (P=0.05)	14.2	4.5	8.0
N (kg/ha)			
60	57	19	28
90	75	24	35
120	88	26	38
CD (P=0.05)	11.0	3.5	6.2

variety 'Kranti' was the tallest and amongst different *gobhi sarson* cultivars, 'Neelam' produced taller plants, while 'Hyola 401' produced significantly shortest plants. Significantly highest number of primary branches/plant was recorded with cultivar 'Sheetal', though it was at par with 'GSL 1' while mustard variety 'Kranti' produced significantly lowest number of primary branches/ plant. However, the trend was reversed for secondary branches/ plant with 'Kranti' producing significantly highest and 'Sheetal' lowest number of secondary branches/plant. Siliquae/plant and seeds/siliqua were significantly highest in Hybrid 'Hyola 401', while lowest in 'Kranti'. Mustard variety 'Kranti' remaining at par with *gobhi sarson* varieties 'Sheetal' and 'Hyola 401' produced seeds with significantly highest 1,000-seed weight while lowest was recorded from 'GSL 1'.

Significantly highest values for all the parameters except 1,000-seed weight were recorded with application of 120 kg N/ha, though these were at par with the values recorded with application of 90 kg N/ha, while the lowest values were recorded with the application of 60 kg N/ha. The 1,000-seed weight was not affected by different nitrogen levels.

Seed yield

All the *gobhi sarson* cultivars gave significantly higher yield than Indian mustard cv. 'Kranti' (Table 1). Amongst the different *gobhi sarson* cultivars, 'Hyola 401' gave significantly the highest seed yield being at par with 'Sheetal'. Further, 'Sheetal' and 'GSL 1' being at par gave significantly higher yield over 'Neelam'.

Increase in N application significantly increased the seed yield. Significantly highest yield was recorded with 120 kg N/ha, being 34.1% higher than that obtained with the application of 60 kg N/ha (based on an average of 3 years). The response of *gobhi sarson* to N application even up to 120 kg/ha may be attributed to the high N requirement of this crop. Similar results showing increasing seed yields with increasing nitrogen application were also reported by Thakur and Chand (1998) in *gobhi sarson* and Bhari *et al.* (2000) in Indian mustard.

Interaction between varieties and nitrogen levels on seed yield was not found to be significant.

Oil content, oil yield and protein content

The oil content was neither affected by *gobhi sarson* varieties nor by nitrogen levels, though the differences in the seed yield were also reflected in oil yield. Significantly highest oil yield was recorded from 'Hyola 401' though it was at par with 'Sheetal', while, 'Kranti' gave the lowest oil yield. Similarly, the oil yield increased with increasing

level of N application with significantly highest oil yield obtained with 120 kg N/ha. Bhalerao (2001) also reported similar results showing increase in oil yield with increasing level of N.

There were no significant differences among different varieties of *gobhi sarson* for protein content, though it differed significantly with varying levels of nitrogen. Application of 120 kg N/ha resulted in significantly higher protein content which was at par with the protein content obtained with the application of 90 kg N/ha.

Nutrient uptake

The trend which was observed for seed yield was also seen for nutrient uptake with significantly highest values recorded from 'Hyola 401' for nitrogen, phosphorus and potassium uptake and significantly lowest from 'Kranti' (Table 2).

Nitrogen levels also significantly affected the nutrient uptake. Nitrogen uptake was significantly highest with 120 kg N/ha, followed by 90 kg N/ha and 60 kg N/ha, each differing significantly from one another. Significantly highest values of phosphorus and potassium uptake were recorded with 120 kg N/ha though these were at par with 90 kg N/ha, while lowest values were recorded with 60 kg N/ha. The increase in nutrient uptake due to increasing application was because of favourable effect of N on all the growth and yield attributes, particularly root and shoots growth which might have facilitated the absorption of nutrients from a larger area in the soil. Similar results were also reported by Singh and Singh (1998).

REFERENCES

Bhalerao, P.D. 2001. Effect of irrigation and nitrogen on Indian mustard (*Brassica juncea*) varieties in Vidarbha region. *Indian Journal of Agronomy* **46** (4) : 727–731.

Bhari, N.R., Siag, R.K. and Mann, P.S. 2000. Response of Indian mustard (*Brassica juncea*) to nitrogen and phosphorus on Torrissments of north-western Rajasthan. *Indian Journal of Agronomy* **45** (4) : 746–751.

DES, 2000. *Statistical Outline of Himachal Pradesh.* Directorate of Economics and Statistics, Government of Himachal Pradesh, Shimla. pp. 64.

Singh, R.P. and Singh, Y. 1998. Performance of rainfed Indian mustard (*Brassica juncea*) varieties at varying levels of nitrogen. *Indian Journal of Agronomy* **43**(4) : 709–712.

Thakur, K.S. and Chand, Jagdish. 1998. Response and economics in relation to nitrogen and phosphorus nutrition in *gobhi sarson* (*Brassica napus* subsp. *oleifera* var. *annua*) under rainfed condition. *Indian Journal of Agronomy* **43** (4) : 733–737.